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(54) A DISTRIBUTION SYSTEM FOR ROLLABLE OR SLIDABLE ARTICLES

(71) We, KOSAN CRISPLANT A/S, of Bryggervej 21, 8240 Risskov, Denmark, a company organised under the laws of Denmark, do hereby declare the invention for which we pray that a patent may be granted performed to be particularly described in to us, and the method by which it is to be and by the following statement:—

The present invention relates to a storage, transportation and handling apparatus for articles such as gas bottles or cylinders, beer casks and other generally rollable or slidable articles to be distributed from a store or a filling station to local customers or dealers by means of lorries.

Normally the articles are containers which are placed in upright positions on the body of the lorry or on pallets thereafter deposited on the body of the lorry, usually with a second layer of container loaded pallets placed on the top of the containers or the top of the box like pallet structures of the lower layer of containers. The lorry driver thereafter visiting the local customers or dealers manually unloads a container or as many containers as required and takes on a corresponding number of empty containers at convenient places of the lorry body. However the work is rather hard so as to usually require two men on the lorry, and besides it can be rather difficult to arrange and rearrange the containers as the filled containers are gradually replaced by empty containers.

Embodiments of this invention seek to provide a distribution system which largely facilitates the handling of the containers.

According to the invention there is provided an apparatus for articles such as gas cylinders, beer casks and other generally rollable or slidable articles to be distributed from a store or a filling station to local customers or dealers by means of a lorry, wherein the apparatus comprises a box structure mounted or mountable on the lorry

and forming a magazine for the containers and comprising elongate ramp means for supporting a row of lying containers in such a manner that the containers tend to roll or slide towards an outlet opening adjacent the lower end of the ramp, outlet control means operable to release the containers one by one being provided adjacent said outlet opening, and said box structure having an inlet opening adjacent the top end of said ramp means wherein the outlet control means comprise retractable stop members mounted in the path of movement of the containers adjacent the outlet end of the lowermost ramp portion.

It is obtained hereby that the containers are held in one or more magazines on the lorry so as to be consecutively removable from said outlet opening which is conveniently located in a relatively low level, while the empty return containers may be consecutively introduced through said inlet opening at a higher level. In this manner the operator will have no problems in rearranging the full and empty containers, and every full container will be easily accessible in a low level position.

Further, according to the invention, the said ramp means may comprise several ramp portions arranged in zig-zag down through the magazine structure so as to be able to support a continuous, zig-zag shaped row of lying containers, whereby each box or magazine on the lorry may hold a considerable number of containers. The level of the outlet opening normally being given by the level of the body of the lorry, the level of the inlet opening in case of e.g. four zig-zag ramp portions will usually be relatively high, and it is an important feature of the invention, therefore, that the lorry may be equipped with lift means operable to receive empty return containers in a low level position and to lift these containers to a position flush with said inlet opening and

to effect introduction of the containers through the inlet opening. The lift means may additionally be adapted so as to be operable to receive full containers from said outlet opening and to lower these to a low level position from which they are easy to remove manually or otherwise. Generally, therefore, the driver of the lorry will be able to distribute the containers without needing an assistant, i.e. an apparatus according to the invention is labour saving to a considerable degree.

Also in the store or filling plant an apparatus according to the invention may give rise to labour savings, because the magazine box structures are easily to fill or refill with full containers. According to the invention an apparatus may comprise a loading station adapted to receive the said box structures, alone or carried by the lorry, in a centered position in which the inlet opening of the apparatus is located just outside the lower end of a stationary loading ramp of the loading station, while the outlet opening of the apparatus is located correspondingly adjacent the upper end of a stationary receiver ramp of the loading station, whereby full containers are easily and rapidly rolled into the box structure as the return containers are rolled out therefrom. Several pairs of such ramps may be arranged side by side so as to be operable to effect reloading of all the box structures on the lorry at the same time.

When, according to the invention, the box structures are made as individually movable cassettes even the dealers may take advantage of them, since with the use of a suitable hoisting or lifting arrangement the lorry operator may deposit one or more cassettes with the dealer, who may thereafter use the cassette as a magazine for easy removal of containers therefrom. The empty containers are consecutively loaded into the cassette through the upper inlet opening, and when all full containers have been replaced by empty containers the lorry may bring the entire cassette back to the filling station.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a perspective view of a lorry equipped with an apparatus according to the invention,

Figs. 2 and 3 are sectional views of the apparatus,

Fig. 4 is a side view of a modified apparatus,

Fig. 5 is a plane schematic view illustrating the function of the outlet control means,

Fig. 6 is a plane elevation of the lorry body equipped with a number of boxes or cassettes according to figs. 5 and 6, and

Fig. 7 is a schematic view illustrating the reloading of the boxes with full containers.

On the body of the lorry shown in figs. 1 and 3 is placed a number of crosswise arranged, flat box structures 2 each having at one side an upper opening 4 and a lower opening 6. Inside each box is arranged a number of slightly inclined chutes 8, of which the uppermost projects inwardly from the lower edge of the opening 4 to a point spaced somewhat from the opposed wall of the box, while the next projects from this opposed wall towards the first wall portion, and so forth. The lower chute 8 extends all the way between the walls so as to end adjacent the lower edge of the lower opening 6. As shown, the chutes 8 serve to carry a continuous row of lying gas cylinders or bottles 10 in such a manner that when the lowermost bottle 10' is taken out through the opening 6 of the entire bottle row will move forwardly by one bottle width. In front of the lowermost bottle is arranged a retractable stop 12, and behind this bottle another retractable stop 14 is arranged, these stops being sequentially operable so as to cause release of one bottle at a time.

It will be appreciated that in this manner the operator can easily take out one or more bottles from each selected box or cassette structure 2, of which some may hold small and some large standard sizes of bottles. The operator need not at all enter the body of the lorry, and all full bottles will be delivered conveniently in a relatively low position. The empty return bottles are put into the cassettes through the top openings 4, whereby each cassette will be "emptied" in a well defined manner as the first empty bottle reaches the delivery opening 6.

Preferably the cassettes 2 are made as movable units having in their rear side a lower opening 16 enabling them to be handled by a fork truck, whereby they are removable from the lorry.

When the cassettes 2 are made as separate units which are individually removable from the body of the lorry they may be used alternatively in that they are delivered as a whole to a local dealer and replaced by a similar cassette of empty bottles. In that case the dealer will get the advantage that he can vary easily take out the full bottles from the lower opening 6 of the cassette now standing on the ground or another suitable support and fill the empty bottles into the cassette through the upper opening 4, whereafter the cassette is simply exchanged by a new cassette as a unit the next time the dealer is visited by the lorry.

In order to further facilitate the operator's handling of single bottles to be delivered from the lorry the lorry may be provided with a bottle lift structure as shown in figs. 1 and 3. This structure comprises a front

and a rear post 18 carrying between them a horizontal bar 20 which—in a manner not shown in detail—is raisable and lowerable along the posts 18 by means of any suitable hoist mechanism. The bar 20 is provided with protruding carrier brackets 22 capable of supporting a lying bottle 10 whereby, when the bar 20 is located as shown in full lines in figs. 1 and 3 a bottle 10 released from any of the lower cassette openings 6 will be received by the brackets 22 so as to be brought to rest just outside the outlet opening 6. Thereafter the operator actuates the said hoist mechanism so as to lower the bar 20 and thereby bring the brackets 22 with the full bottle down into the position shown in dotted lines at 24 in fig. 3, i.e. sufficiently close to the ground that the bottle is very easy to handle manually thereafter. Thereafter an empty bottle may be placed on the brackets 22 adjacent the cassette 2 and be lifted up to the upper opening 4 by actuating the hoist mechanism, this position being shown at 26 in fig. 3. The hoist mechanism is so adapted that the brackets 22 are swung upwardly from the position 26 so as to cause the empty bottle to roll inwardly through the upper opening 4 into the uppermost chute 8. Thereafter the brackets 22 may be lowered again to their initial positions.

Of course, a similar hoist arrangement may be used in a stationary manner in a dealer's station for co-operation with one or a few cassettes only.

Figure 4 illustrates a practical construction of the cassette as made as a framework structure. The bottle outlet locks 12 and 14 are arranged in such a manner that the outermost lock 12 is spaced about a bottle width from the outlet opening, while the lowermost support rail ends are correspondingly spaced therefrom. When a bottle is released it will leave the support rail and fall down onto the bottom rail structure of the cassette so as to be received in an antechamber 15 in which the bottle is held back from rolling out of the outlet opening by means of a front cross beam 17 defining the lower edge of the outlet opening. The operator may then take out the bottle through the outlet opening either for direct removal of the bottle or for placing it in the said elevator for letting down the bottle to the ground or adjacent the ground. Thus, the operator may release the bottle without having to immediately further handle the bottle, this feature being advantageous especially in connection with a central simultaneous release control for all cassettes as described in more detail below.

Moreover, figs. 4-6 show an improved release control system in which the lock members 12 and 14 are constituted by generally triangular members arranged so as to

be vertically pivotal about pivot points 13. These lock members are holdable in their downwardly protruding lock positions by means of pressing shoes or rollers 50 and 52 on an overhead control rod 54, these rollers cooperating with the top side of the front nose portion of the respective lock members 12 and 14 so as to prevent the lock members from being swung upwardly. The control rod 54 is horizontally swingable about a pivot point 56 located between the lock members, and its projects out through a slot 58 in the front side of the cassette, its front end preferably being provided with a handle 60.

As shown in fig. 5 the control rod 54 is so arranged that when swung at one side to a position designated I its roller 52 will remain in locking engagement with the lock member 14, while the roller 50 is out of engagement with the lockmember 12. Consequently, when the rod 54 is swung to position I the foremost bottle or cylinder 10 will cause the lock member 12 to be swung upwardly and will then roll forwardly into the antechamber 15, while the following bottle is held back by the lock member 14. When thereafter the rod 54 is swung into an opposed position designated II the roller 50 stabilizes the lock member 12 in its lowered locking position, while the roller 52 is moved out of engagement with the lock member 14. The said following bottle or cylinder, therefore, will be able to force the lock member 14 upwardly and roll forwardly against the actuated lock member 12. Thus, swinging of the control arms 54 from position II to position I and back again will cause the foremost bottle or cylinder to be released in a very safe manner.

The control arms 54 of the different cassettes may be connected to a common control rod or cable 62 (fig. 6) extending horizontally along the front sides of the cassettes so as to be operable to shift all the control arms simultaneously between the said positions. The cable 62 has a number of eye or hook members which are releasably connected to corresponding hook or eye members associated with the handle arms 54. The cable forms an endless loop guided by cable wheels 64 so as to have a horizontal run past the arms 54 and a vertical run adjacent one of the rigid posts 18 of the lorry. At the latter place is provided a vertical working cylinder 66 the piston rod of which is connected to a point of the cable so as to be operable to reciprocate the cable for operating the release control arm 54.

Thus, when the operator actuates the cylinder 66 to carry out one working and return stroke of the piston rod the foremost bottle in each cassette will be released and fall out into the antechamber 15, from which the operator may then manually and con-

secutively take out the respective bottles without having to actuate the release mechanism for each bottle. On the other hand, if it is desired to release an extra bottle from one of the cassettes it is possible to do this by releasing the hook connection between the cable 62 and the particular control arm 54 and then operate the control arm manually by means of the handle 60.

Underneath the lower support rail is mounted an additional rail member 68 which is telescopically connected with the support rail so as to be operable to be pulled forwardly to the position shown in dotted lines, in which it bridges the antechamber 15 and projects outwardly of the outlet opening above the cross beam 17, whereby the released bottles may roll out freely through the outlet opening, this being desirable when delivering bottles to a receiving station having ramp means at the required level for receiving the bottles directly from the outlet openings, e.g. in connection with reloading of the cassettes in the filling plant.

A preferred manner of reloading the cassettes with full bottles will be to move the lorry to a loading station having lower ramp means for receiving the empty bottles from the outlet openings of all cassettes at one time and upper ramp means for guiding full bottles into the upper inlet openings. The invention comprises such a loading station in which means are provided for consecutively receiving full bottles from a filling station or store arranging the bottles in lying positions on said upper ramp means, and releasing the lying bottles for allowing them to roll into the said inlet openings of the cassettes, the loading station further comprising the said lower ramp means operable to receive the empty bottles let out through said outlet openings of the cassettes and means for raising these bottles to an upright position and transferring them to conveyor means for bringing the bottles to said filling station or to a store of empty bottles. Means for tilting the bottles into a lying or raised position, respectively, are already known in the art, and it will be appreciated, therefore, that a reloading station according to the invention may be constructed in a simple way for automatic handling of the bottles. It is even possible to arrange for accumulation of at least some bottles on said upper ramps, whereby the reloading of the cassettes may take place at increased speed. The number of bottles admitted to each ramp or delivered therefrom may be counted automatically for correct reloading of the cassettes, and the release mechanisms of the cassette outlet openings may be operated automatically during the reloading or the mechanisms may be made entirely inoperative if means are

provided adjacent the lower ramps to control the outlet from the outlet openings of the cassettes.

A reloading system of this nature is illustrated in fig. 7, where the upper feeding ramp is designated 70 and the lower ramp for receiving the empty return bottles is designated 72. The means for tilting the bottles to a lying and an upright position, respectively, are shown at 74 and 76, and the conveyor means for bringing the full bottles to the upper tilting and ramp means 74, 70 are designated 78, while the conveyor means for bringing the empty bottles away from the lower ramp 72 and its associated tilting mechanism 76 are designated 80.

Numerous modifications will be possible within the scope of the invention. Thus, of course, the cassettes or corresponding rigid box structures could be oriented lengthwise on the lorry, and loose cassettes may be placed on the top of each other. The use of slightly inclined chutes 8 is advantageous in connection with cylindrical articles which can then roll by themselves, but it would be possible to arrange for sliding trays supporting non-cylindrical articles.

The inlet opening may be located in the top side of the box or cassette, or in the lateral side opposite to that of the outlet opening. The outlet opening may be provided in the bottom side. The important feature is that there is provided a magazine system from which the articles to be distributed can be delivered consecutively to one or more discharge openings of well defined, convenient locations. Obviously this system will be advantageous also for the distribution of articles in connection with which there are no return articles to be brought back to the loading station, e.g. if the articles are full sacks.

WHAT WE CLAIM IS:—

1. A storage, transportation and handling apparatus for articles such as gas cylinders, beer casks and other generally rollable or slidable articles to be distributed from a store or a filling station to local customers or dealers by means of a lorry, wherein the apparatus comprises a box structure mounted or mountable on the lorry and forming a magazine for the containers and comprising elongate ramp means for supporting a row of lying containers in such a manner that the containers tends to roll or slide towards an outlet opening adjacent the lower end of the ramp, outlet control means operable to release the containers one by one being provided adjacent said outlet opening, and said box structure having an inlet opening adjacent the top end of said ramp means wherein the outlet control means comprise retractable stop members mounted in the path of movement of the containers adjacent the outlet end of the

lowermost ramp portion.

2. An apparatus according to Claim 1, wherein the ramp means comprises a plurality of ramp portions arranged in zig zag down through the box structure so as to be able to support a continuous, zig zag shaped row of containers.

3. An apparatus according to Claim 1 or Claim 2, wherein the lorry is further provided with a lift arrangement operable to receive return containers in a relatively low level and lift the same to a position outside said inlet opening and effect introduction of the containers into said inlet opening.

4. An apparatus according to Claim 3 when appended to Claim 2, wherein the zig zag ramp means comprises an even number of ramp portions, preferably at least four ramp portions located above each other, whereby said inlet opening is situated vertically above said outlet opening at the same side of the box structure, and wherein said lift arrangement is adapted not only to lift return containers up to the inlet opening, but additionally to receive containers from said outlet opening and lower these containers towards the ground.

5. An apparatus according to any preceding Claim, wherein the box structure is designed as a cassette mounted or mountable on the body of the lorry in parallel with other similar cassettes.

6. An apparatus according to Claim 5, when appended to Claim 3 or Claim 4, wherein the lift arrangement comprises an elongate container carrier extending along one side of the body of the lorry and means operable to lift the carrier from a low receiving position to a high position adjacent the top inlet openings of all the cassettes.

7. An apparatus according to Claim 6, wherein the container carrier is guided so as to carry the containers to said top inlet openings and to be tilted in response to reaching the top position so as to cause the containers to be loaded into the top inlet.

8. An apparatus according to any preceding Claim, a first said stop member being operable to releasably hold back the first container to be delivered from the ramp and a second said stop member being operable to releasably hold back the following container, actuator means being provided for successively releasing said first stop member for the delivery of the first container, re-actuating the first stop member, releasing the second stop member for allowing the row of containers to advance, and re-actuating the second stop member when said following container is stopped by said first stop member.

9. An apparatus according to claim 8, wherein the actuator means includes a swingable lever pivoted horizontally so as to in a first position actuate said first stop

member while holding the second stop member non-actuated, in a second position actuate both of said stop members, and in a third position actuate said second stop member while holding the first stop member non-actuated.

10. An apparatus according to claim 8 or claim 9, where claim 8 is appended to claim 5, wherein said actuator means has an operation handle portion projecting from said box structure or cassette, and wherein these handle portions of the several box or cassette structures are interconnected or interconnectable so as to be simultaneously operable by common control means to let out one container from each box or cassette.

11. An apparatus according to claim 10, wherein said common control means comprise a rod or wire extending along the row of boxes or cassettes on the lorry and being releasably connected to the various actuator handle portions and connected by movement control means powered preferably hydraulically by the engine of the lorry.

12. An apparatus according to claim 5, or any claim appended to claim 5, wherein the cassettes are designed so as to be individually movable by means of a fork truck or other lifting or hoisting equipment.

13. An apparatus according to any of the preceding claims, wherein between said outlet control means and said outlet opening there is provided an antechamber operable to receive a container as released by said outlet control means, the bottom of the antechamber being located in a level below the delivery end of the ramp means and below the lower edge of the outlet opening, and wherein support means are provided for selectively bridging the antechamber so as to allow a released container to roll from said outlet control means directly out through the outlet opening.

14. An apparatus as claimed in any of the preceding claims in combination with a central store or filling station for the containers to be distributed, wherein said store or filling station comprises a station for receiving in a centered position the box or cassette structure or structures, whether supported by said lorry or individually by special support means upon removal from the body of the lorry, said receiving station comprising lower inlet ramp means located flush with said outlet opening of the box or cassette structure in said centered position thereof so as to be able to receive containers let out through the outlet opening and upper outlet ramp means located correspondingly flush with said inlet opening so as to be operable to guide filled containers into the box or cassette structure.

15. A combination according to Claim 14, wherein inside the store or filling station means are provided for consecutively bring-

ing a row of upright, filled containers towards said upper ramp means and for tilting the containers to bring them into a lying position on the ramp means so as to arrange
5 the lying containers in a row on said upper ramp means preparatory to the containers being let into the box or cassette structure.

16. A combination according to Claim 14 or Claim 15, wherein inside the store or filling station means are provided for consecutively receiving the lying containers from
10 said lower inlet ramp means and raising them to an upright position and then transferring them to a store or a filling station.

17. A storage, transportation and handling system substantially as herein described with reference to and as shown in the accompanying drawings.

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2 SHEETS

COMPLETE SPECIFICATION

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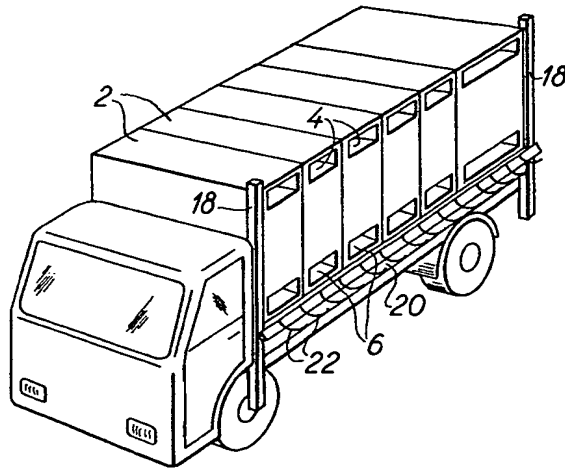


Fig. 1

Fig. 2

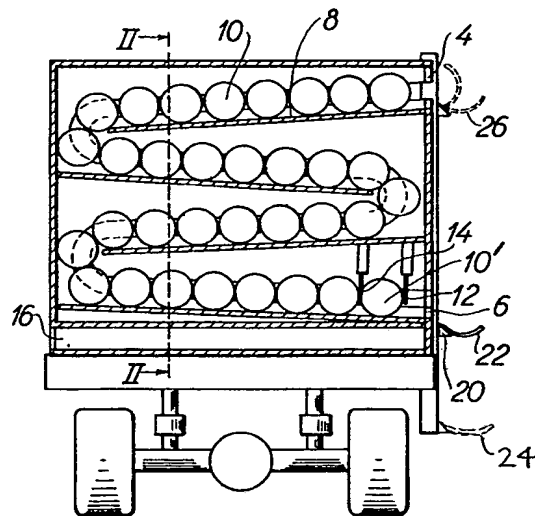
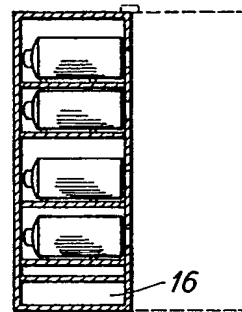


Fig. 3

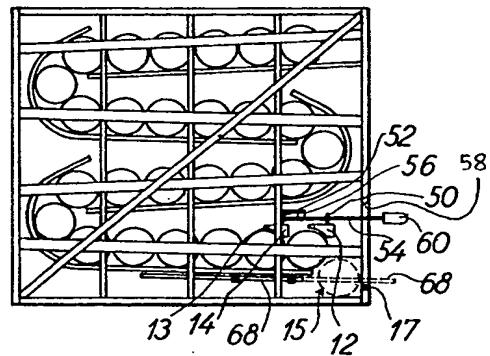


Fig. 4

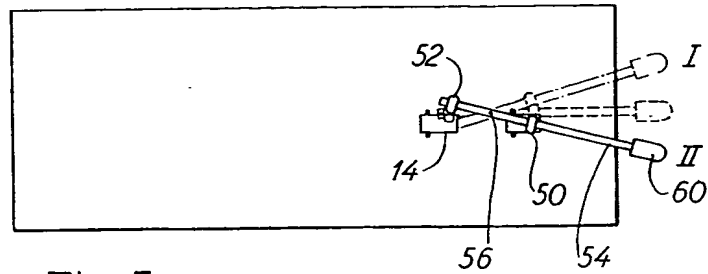


Fig. 5

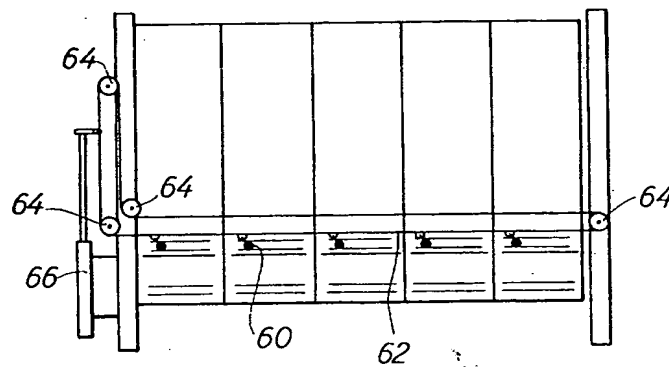


Fig. 6

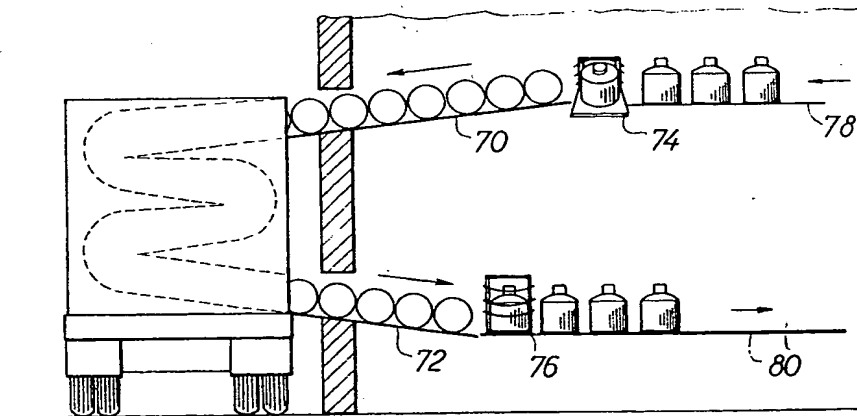


Fig. 7